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System for fixing a biomedical electrode

The present invention relates to a system for fastening a biomedical electrode. More precisely, it relates to a system  
5 for fastening a biomedical electrode that includes resilient snap-on fastening means.

The patent documents US 3 882 853, US 4 660 562, CH 668 690, US 6 276 054, FR 1 314 201 and WO 01/17423 disclose  
10 fastening systems for an electrode to be used only once. Usually, the electrode consists of a flexible element of plane shape that includes an adhesive face, intended for fastening the electrode to a person's skin, and a face provided with a male conductive element. Each electrode is  
15 associated with a cable provided at one of its ends with a female element intended to accommodate the aforementioned male element.

The object of the present invention is to improve the  
20 connection between the male element and the female element, in particular so as to obtain better mechanical strength and better conduction between the electrode and the cable, and also to make it easier to position the female element on the male element when fastening them together.

25 The invention relates to an assembly comprising a biomedical electrode, a cable and resilient snap-on fastening means intended to fasten said electrode to said cable, said fastening means comprising a male element and a female  
30 element, characterized in that the male element has an orifice and in that the female element has a protuberance, the latter being shaped so as to be housed in said orifice when fastening the two elements together.

35 According to a preferred embodiment of the invention, the male element is placed on the electrode and the female

element is situated on one end of the cable.

According to one variant, the fastening system is identical to that of the prior art disclosed above. However, it  
5 differs in that the male element includes on its upper face an orifice and in that the female element includes in its cavity a protuberance intended to be housed in the orifice of the male element once the two elements have been fastened together.

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To make it easier to fasten the two elements, but also to keep them in place once they have been fastened, it is preferred to choose a fastening system characterized in that the male element comprises a first portion of substantially  
15 frustoconical shape, located on the side facing the female element, which first portion is placed on a second portion of substantially frustoconical shape, which is the reverse of that of the first portion. Relative to the principal vertical axis of the male element, the angle made by the  
20 side wall of the first portion is less than the angle made by the side wall of the second portion.

According to variant of the invention, the angle made by the side wall of the first portion lies between  $5^{\circ}$  and  $15^{\circ}$  and  
25 the angle made by the side wall of the second portion lies between  $30^{\circ}$  and  $50^{\circ}$ .

One particularly advantageous configuration is obtained when the angle made by the side wall of the first portion is  
30 approximately equal to  $8^{\circ}$  and when the angle made by the side wall of the second portion is approximately equal to  $40^{\circ}$ .

The invention also relates to an electrode as described  
35 above and to a cable provided with a female plug as described above.

One embodiment of the invention will be described in detail

below by means of the following figures:

Figure 1 illustrates an assembly comprising an electrode, a cable and fastening means.

Figure 2 shows a cross section of the male element and  
5 of the female element, the elements being separate from each other.

Figure 3 shows a cross section of the male element and of the female element, the elements being fastened together.

10 As may be seen in figure 1, a flexible electrode 1 of flat shape is provided on its upper face with a male element 3. The latter (see also figure 2) consists mainly of a first part 6 of frustoconical shape and a second part 7, also of frustoconical shape but the reverse of the first part.  
15 Placed on the upper face of the male element is an orifice 5.

The female element 4 comprises a cavity 8 intended to surround the male element 3.

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The inside of the cavity 8 includes a pin 9, preferably made of a conductive material.

Once the two elements have been fastened together (see  
25 figure 3), the pin 9 is in intimate contact with the walls of the orifice 5 of the male element 3.

As may be seen in figure 2, the angle  $\alpha$  defined between the vertical and the side wall of the upper portion 6 of the  
30 male element 3 is less than the angle  $\beta$  defined between the vertical and the side wall of the lower portion of the male element 3.

It has been found that an angle  $\alpha$  approximately equal to  $8^\circ$   
35 and an angle  $\beta$  approximately equal to  $40^\circ$  constitutes a good compromise, in order to provide easy fastening at the same time as an effective retention force.

It goes without saying that the invention is not limited to one particular shape of electrode. Likewise, the choice of materials and the geometry of the various elements are therefore not limited to what has been described in the  
5 example discussed above.

Furthermore, the invention is not limited to one particular field of use. Preferably, it is aimed at the field of muscular electrostimulation, but it may also be applicable  
10 elsewhere, for example for establishing an electrocardiogram.